

**18th Symposium on the
Application of Geophysics to
Engineering and Environmental
Problems (SAGEEP 2005)**

**Geophysical Solutions for Today's
Challenges**

**Atlanta, Georgia, USA
3-7 April 2005**

Volume 1 of 2

ISBN: 978-1-62276-066-4

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2005) by the Environmental and Engineering Geophysical Society
All rights reserved.

Printed by Curran Associates, Inc. (2012)

For permission requests, please contact the Environmental and Engineering Geophysical Society
at the address below.

Environmental and Engineering Geophysical Society
1720 South Bellaire
Suite 10
Denver, Colorado 80222-4303

Phone: (303) 531-7517
Fax: (303) 820-3844

staff@eegs.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

VOLUME 1

ADVANCES IN SENSOR DESIGN FOR GEOTECHNICAL PURPOSES

A GROUND PENETRATING RADAR SYSTEM FOR HIGH LOSS ENVIRONMENTS	1
<i>David L. Wright, Charles P. Oden, Michael H. Powers, Craig W. Moulton, S. Raymond Hutton, John D. Kibler, Gary R. Olhoeft, William F. Woodruff</i>	
MULTI-COMPONENT GROUND PENETRATING RADAR FOR IMPROVED IMAGING AND TARGET DISCRIMINATION	11
<i>Douglas S. Sassen, Mark E. Everett</i>	
A NEW APPROACH FOR REAL TIME PIPE LOCATING	21
<i>David B. Cist</i>	
EFFICIENT LARGE-SCALE UTILITY MAPPING WITH RADAR AND INDUCTION ARRAYS	31
<i>Michael Oristaglio, Ralf Birken, Thorkild Hansen, Ross Deming, Scott MacIntosh, Qifu Zhu</i>	
SIMULTANEOUS GEOPHYSICAL SURVEYS USING A TOWED MULTISENSOR PLATFORM AND ITS APPLICATION TO CHARACTERISATION OF BROWNFIELD SITES	44
<i>Chris Leech, Ian A. Hill, Tim M. Grossey</i>	
A WIDE-BAND ELECTROMAGNETIC IMPEDANCE PROFILING SYSTEM FOR NON-INVASIVE SUBSURFACE CHARACTERIZATION	54
<i>Hung-Wen Tseng, Ki Ha Lee, Alex Becker</i>	

ARCHAEOLOGICAL STUDIES

AN ARCHAEOLOGICAL INVESTIGATION OF THE SAN MARCOS PUEBLO, NEW MEXICO, USA	61
<i>Jacob Hodges, John Ferguson, Louise Pellerin</i>	
PROGRESS IN THE GEOPHYSICAL DELIMITATION OF FORT ST. JOSEPH, NILES, MI	69
<i>Laura Smart, William Sauck, Daniel Lynch</i>	
ARCHAEOLOGICAL RECONNAISSANCE AT TEL YAVNE, ISRAEL: 2-D ELECTRICAL IMAGING AND LOW ALTITUDE AERIAL PHOTOGRAPHY	78
<i>Paul C. Bauman, Dan Parker, Avner Goren, Richard Freund, Phillip Reeder</i>	
GPR AND ARCHAEOLOGICAL EXCAVATIONS AT THE WEST POINT FOUNDRY, NEW YORK	91
<i>Kimberly Finch, Charles T. Young</i>	
GEOPHYSICAL INVESTIGATION AT ARCHEOLOGICAL SITES IN PENINSULAR THAILAND	103
<i>Warawutti Lohawijarn, Pongdhan Sampaongeon</i>	

BOREHOLE INVESTIGATIONS

ESTIMATING DIPPING ANGLE WITH CROSS-BOREHOLE RADAR: NO TOMOGRAPHY REQUIRED	110
<i>Dale F. Rucker, James B. Fink, Marc T. Levitt, Danney R. Glaser II, Christopher A. Baldyga</i>	
TRAVEL TIME TOMOGRAPHY USING FREQUENCY RESPONSES COLLECTED BY CWR EXPERIMENTATION	120
<i>Mohammad Farid, Akram N. Alshawabkeh, Carey M. Rappaport</i>	
SYNTHETIC CROSSHOLE TOMOGRAPHY STUDIES OF BRIDGE FOUNDATION SITES IN KARST TERRANE	131
<i>Dennis R. Hiltunen, Gye-Chun Cho</i>	
BOREHOLE GEOPHYSICS AND HYDROPHYSICAL LOGGING OF FRACTURED BEDROCK AT THE ALARK HARD CHROME FACILITY, RIVERSIDE, CALIFORNIA	141
<i>Lewis E. Hunter, William H. Pedler, David W. Henry, Nancy Barnes, John Erwin, David Stensby</i>	

CONTAMINATION STUDIES

3D RESISTIVITY AND IP TOMOGRAPHY AS EFFICIENT TOOLS TO MONITOR REMEDIAL ACTIONS OVER A GAS PLUME 155
John Deceuster, Mélanie Chaballe, Olivier Kaufmann

STUDY OF PETROLEUM CONTAMINATED SITES IN MEXICO WITH RESISTIVITY AND EM METHODS..... 167
Vladimir Shevnin, Omar Delgado Rodriguez, Aleksandr Mousatov, Hector Zegarra Martinez, Jesus Ochoa Valdes, Albert Ryjov

RESISTIVITY INVESTIGATION FOR MAPPING POLLUTED AREAS IN AND AROUND HYDERABAD, INDIA 177
B. Venkateswara Rao, C. Prem Chand, M. Anwar

DETERMINING SOIL PROPERTIES FROM GEOPHYSICAL DATA

SOIL COMPOSITION DETERMINATION BASED ON SOIL OPTICAL PROPERTIES IN THE THERMAL INFRARED..... 190
J. Michael Cathcart, Robert D. Bock

FREQUENCY DOMAIN ANALYSES OF TDR WAVEFORMS FOR SOIL MOISTURE MEASUREMENTS..... 199
Chih-Ping Lin, Chung-Chih Chung, Shih-Hung Tang

STATISTICAL COMPARISON OF MODELS FOR SOIL DIELECTRIC SPECTRUM 215
X. Yu, V. P. Drnevich, R. L. Nowack

HYDRAULIC CONDUCTIVITY ESTIMATION FROM SPECTRAL INDUCED POLARISATION DATA – A CASE HISTORY 226
Andreas Hördt, Roland Blaschek, Andreas Kemna, Julia Suckut, Norbert Zisser

AN INTERPRETATION OF VARIOUS WELL LOGS ACQUIRED IN UNCONSOLIDATED SOIL FOR HYDRAULIC PROPERTY ESTIMATION..... 236
Chisato Konishi, Genyuu Kobayashi

2-D RESISTIVITY IMAGING AND DETERMINATION OF HYDRAULIC PARAMETERS OF THE VADOSE ZONE IN A CULTIVATED LAND IN SOUTHWESTERN NIGERIA 245
Abel I. Olayinka, Michael A. Oladunjoye

EVALUATION OF MINE FEATURES USING GEOPHYSICS

EVALUATION OF MINE SEALS USING GROUND PENETRATING RADAR 260
William D. Monaghan, Michael A. Trevits, Michael J. Sapko

ELECTRICAL IMAGING OF DEEP CLAY-MINE VOIDS 274
Peter J. Hutchinson

ELECTRICAL PROPERTIES OF LEACH ORE, CRIPPLE CREEK MINING DISTRICT, COLORADO..... 280
Gary W. Horton, Will Frangos

INTERNAL STRUCTURE AND PREFERENTIAL FLOW OF A WASTE ROCK PILE FROM GEOPHYSICAL SURVEYS 289
Michel Chouteau, Jérôme Poisson, Michel Aubertin, Daniel Campos

SPECTRAL INDUCED POLARIZATION (SIP) MEASUREMENTS FOR STABILITY ASSESSMENT OF TAILINGS DAMS 298
Ernst Niederleithinger, Sabine Kruschwitz, Matthias Behrens

USING HELICOPTER ELECTROMAGNETIC SURVEYS TO IDENTIFY POTENTIAL HAZARDS AT COAL WASTE IMPOUNDMENTS 306
Richard W. Hammack, John D. Quaranta, Vladislav Kaminskiy, Kevin Warner, William Harbert

EXOTIC GEOPHYSICS I

VOODOO METHODS: DEALING WITH THE DARK SIDE OF GEOPHYSICS 315
Greg Hodges

HUMAN-SENSED FIELDS: DOES DOWSING RESPONSE CORRELATE WITH-SELF POTENTIAL OR CONDUCTIVITY ANOMALIES? 328
Charles T. Young, James Trow

SMOKE WITHOUT MIRRORS: A NEW TOOL FOR THE GEOPHYSICAL CHARACTERIZATION OF SHALLOW KARST CAVITIES	337
---	-----

Jonathan E. Nyquist, Mary J.S. Roth, Sandra Henning, Ron Manney, John Peake

APPLICATION OF 2D-ERT IN FEASIBILITY STUDY OF HYDROPOWER PROJECTS IN NEPAL	344
---	-----

Surendra Raj Pant

EXOTIC GEOPHYSICS II

GEOPHYSICAL EXPLORATION AT THE GIZA PLATEAU, EGYPT: A TEN-YEAR ODYSSEY	358
---	-----

Thomas L. Dobecki

MEASURING SUB-SEABOTTOM SEISMIC VELOCITIES - SOME UNUSUAL EXPERIMENTS	370
--	-----

James A. Hunter, Susan E. Pullan, Ron L. Good, Robert A. Burns, Marten Douma, Richard D. Miller, Choon B. Park, Jianghai Xia

HOW FAR WILL YOU GO TO COLLECT THE DATA?	387
---	-----

K. Michael Garman, Scott F. Purcell

INTEGRATED GEOPHYSICAL METHODS FOR LNG SITE CHARACTERIZATION IN A JUNGLE ENVIRONMENT	397
---	-----

Finn B. Michelsen, Martin Miele

GEOPHYSICAL SOLUTIONS TO GEOTECHNICAL PROBLEMS

TIME-LAPSE AZIMUTHAL RESISTIVITY SURVEY IN A HIGHLY INDUSTRIALIZED AREA: PROBLEMS, DIAGNOSIS, AND SOLUTIONS	405
--	-----

Les P. Beard, Jacob R. Sheehan, Scott C. Brooks

APPLICATION OF MULTI-CHANNEL ELECTRICAL METHOD IN INVESTIGATION OF HYDRAULIC CHANNELS IN QIU JIA WAN MAIN DIKE OF THE YANGTZE RIVER, CHINA	414
---	-----

Yixian Xu, Jianghai Xia

A HIGH RESOLUTION 3-D IMAGING RADAR SURVEY OF A CONCRETE RING-WALL COLLAR FOR MAPPING THE EXTENT OF CONCRETE DETERIORATION AND DELAMINATION	425
--	-----

Brian Jones, Mario Carnevale, Daniel J. Delea, Jutta Hager

USE OF GROUND-PENETRATING RADAR (GPR) AS AN EVALUATION TOOL IN NINETEENTH-CENTURY BUILDING RESTORATION	433
---	-----

James S. Mellett, Shelley Smith

GEOPHYSICS FOR GROUNDWATER EXPLORATION

APPLICATIONS OF CONTROLLED SOURCE AND NATURAL SOURCE AUDIO-FREQUENCY MAGNETOTELLURICS TO GROUNDWATER EXPLORATION	440
---	-----

Norman R. Carlson, Phillip M. Paski, Scott A. Urquhart

USE OF ELECTROMAGNETIC, GEOELECTRIC AND SEISMIC TOMOGRAPHY REFRACTION GEOPHYSICAL METHODS TO ESTIMATE THE WATER CONTENT IN THE SUBSOIL	451
---	-----

Giovanni Leucci

GEOPHYSICAL CHARACTERIZATION OF SEAWATER INTRUSION IN ANTIGUA, WEST INDIES	463
---	-----

David A. Farrell, Stewart K. Sandberg, Hastin Barnes, Jeff Browne, Anika Sutherland, Judy Humphrey, Barry L. Mayers, Jennifer Weller

GEOPHYSICAL INVESTIGATION OF THE GROUNDWATER REGIMES IN THE LOWER OKAVANGO DELTA, NORTHWESTERN BOTSWANA	476
--	-----

Elisha M. Shemang, Loago N. Molwalefhe, Harish Kumar, Tej Bakaya, Joel Ntsatsi

TEMENOS ESTATES, ANGUILLA, BWI HYDROGEOLOGIC INVESTIGATION, GEOPHYSICAL MAPPING AND WATER SUPPLY DEVELOPMENT	488
---	-----

Sandy Nettles

GEOELECTRICAL EXPLORATION FOR GROUNDWATER AROUND THE NEW COMMUNITIES, EAST NILE DELTA	498
--	-----

Abd El Hamid A. Taha, Ahmed S. El Mahmoudi, Islam M. El-Haddad

GEOPHYSICAL MODELING STUDIES

ESTIMATING SOURCE DEPTH EXTENT FROM INVERSION OF MAGNETIC FIELD DATA – A SYNTHETIC MODELLING STUDY OF THE CRETACEOUS VOLCANIC INTRUSIONS INTO THE EDWARDS AQUIFER, TEXAS	515
<i>Clive A. Foss</i>	
ON TIME-DOMAIN TRANSIENT ELECTROMAGNETIC SOUNDINGS	525
<i>Ruizhong Jia, R. W. Groom</i>	
LATERALLY CONSTRAINED 1D-INVERSION OF 3D TEM DATA	533
<i>E. Auken, A. V. Christiansen, L. Jacobsen, K. I. Sørensen</i>	
INCORPORATION OF VARIABLE BACKGROUND VELOCITY IN SUBSURFACE IMAGING WITH GPR	538
<i>Beiyuan Liang, Lanbo Liu</i>	
COMPARISON OF DISCRETE AND VOXEL 3-D GRAVITY INVERSIONS OVER KARST-RELATED GRAVITY ANOMALIES ON THE COASTAL PLAIN OF NORTH-WEST MALAYSIA	544
<i>Clive A. Foss</i>	

GEOPHYSICAL CASE STUDIES

DETECTION OF SUBSURFACE UTILITIES USING GPR TECHNIQUES	554
<i>Sherif M. Hanafy, Mohamed A Gamal</i>	
UNDERGROUND UTILITY LOCATION CHALLENGES USING GPR: LIFE ON THE STREETS	560
<i>Randy Sorenson, David Tillson</i>	
LOCATION OF MAMMOTH REMAINS IN PERMA-FROST OF NORTHERN SIBERIA USING GPR AND MULTIFREQUENCY EM	569
<i>Ken-Ichiro Makino, Hidetoshi Miura</i>	
TOWED GEO-ELECTRODE ARRAYS FOR ANALYSIS OF SURFACE WATER GROUNDWATER INTERACTION	576
<i>David A. Allen, Noel P. Merrick</i>	
APPLICATION OF NON-DESTRUCTIVE GEOPHYSICAL TECHNIQUES FOR RISK EVALUATION (SANNOUR PROTECTED AREA, BENI SUEF, EGYPT)	586
<i>Sherif M. Hanafy, Essam A. Mors</i>	

GEOPHYSICAL APPLICATIONS TO HOMELAND SECURITY

THE PENTAGON BUILDING PERFORMANCE IN THE 911 CRASH	599
<i>Paul F. Mlakar, Donald D. Dusenberry, James R. Harris, Gerald Haynes, Long T. Phan, Mete A. Sozen</i>	
TESTING A SAFE ACQUISITION PROCEDURE FOR AN EFFECTIVE APPLICATION OF GPR TO SECURITY OPERATIONS	613
<i>Maurizio Lualdi, Luigi Zanzi</i>	
TUNNEL DETECTION ALONG THE SOUTHWEST U.S. BORDER	624
<i>Jose L. Llopis, Joseph B. Dunbar, Lillian D. Wakeley, Maureen K. Corcoran, Dwain K. Butler</i>	
FINAL DISPOSAL OF SPENT NUCLEAR FUEL TRIGGERS SECURITY-RELATED GEOPHYSICS	638
<i>Olli T. Okko</i>	

GEOPHYSICS FOR ENGINEERING

TIME DOMAIN REFLECTOMETRY USES IN GEOTECHNICAL ENGINEERING	645
<i>Vincent P. Drnevich</i>	
PAVEMENT EVALUATION AND DESIGN WITH SEISMIC METHODS	647
<i>Soheil Nazarian</i>	
REFLECTION SEISMOLOGY: APPLICATION TO IDENTIFYING FAULT STRUCTURE	649
<i>Richard T. Williams, Vladimir A Babeshko, Ernest Kutsenko</i>	
SHEAR-WAVE VELOCITY AND LIQUEFACTION POTENTIAL FOR SOILS UNDER DYNAMIC LOADING	652
<i>Ronald D. Andrus</i>	
SHEAR-WAVE VELOCITY (VS) PROFILING BY SURFACE WAVE (MASW) METHOD	656
<i>Choon B. Park</i>	
SURFACE WAVE ANALYSIS USING WAVELET TRANSFORMS	658
<i>Nenad Gucunski, Parisa Shokouhi</i>	

MAGNETIC SOILS AND GEOPHYSICAL SURVEYS

COMPARISON OF LABORATORY-BASED MULTI-FREQUENCY SYSTEMS FOR MEASURING MAGNETIC SUSCEPTIBILITY	660
<i>Ryan E. North, Eric W. Smith, Gary L. Cavanaugh</i>	
MINERALOGY OF MAGNETIC SOILS AT A UXO REMEDIATION SITE IN KAHO'OLAWA HAWAII	666
<i>Remke L. Van Dam, J. Bruce, J. Harrison, Jan M.H. Hendrickx, Deidre A. Hirschfeld, Ryan E. North, Janet E. Simms, Yaoguo Li</i>	
EXAMPLES OF THE EFFECT OF MAGNETIC SOIL ENVIRONMENTS ON TIME DOMAIN ELECTROMAGNETIC DATA	678
<i>Sean E. Walker, Leonard R. Pasion, Stephen D. Billings, John Foley, Yaoguo Li, Douglas W. Oldenburg</i>	
EVALUATING THE EFFECTIVENESS OF VARYING TRANSMITTER WAVEFORMS FOR UXO DETECTION IN MAGNETIC SOIL ENVIRONMENTS	688
<i>Leonard R. Pasion, Sean E. Walker, Douglas W. Oldenburg, Stephen D. Billings, John Foley</i>	

VOLUME 2

NOVEL APPLICATIONS OF GEOPHYSICAL METHODS

TERRAIN CONDUCTIVITY FOR MAPPING SUBSTRATE RESISTIVITY OFFSHORE TAMPA BAY, FLORIDA	698
<i>Stewart K. Sandberg, Sarah Kruse, Jason Greenwood, Arnell Harrison</i>	
COMBINING EM AND LIDAR TO MAP COASTAL WETLANDS: AN EXAMPLE FROM MUSTANG ISLAND, TEXAS	707
<i>Jeffrey G. Paine, William A. White, Rebecca C. Smyth, John R. Andrews, James C. Gibeaut</i>	
UNCONVENTIONAL DEEP-WATER GPR INVESTIGATION OF DRILLING OBSTRUCTIONS	719
<i>Jutta Hager, Mario Carnevale, Brian R. Jones</i>	
UNCOMMON APPLICATIONS OF COMPUTER ASSISTED RADAR TOMOGRAPHY	727
<i>Kate McKinley, E. Jorgen Bergstrom</i>	

NOVEL APPLICATIONS FOR UXO DETECTION

A SHALLOW WATER UXO SURVEY SYSTEM	733
<i>Jim R. McDonald, Chester F. Bassani, David J. Wright</i>	
DETECTION OF UXO IN MARINE ENVIRONMENTS WITH TOWED ARRAY IP MEASUREMENTS	740
<i>D.D. "Skip" Snyder, Scott C. MacInnes, Douglas LaBrecque, Roger Sharpe</i>	
DESIGN AND TESTING AN AIRBORNE SQUID MAGNETOMETER FOR UXO DETECTION	753
<i>T.J. Gamey, W.E. Doll, L.P. Beard, J.R. Sheehan</i>	

POSTER PRESENTATIONS

SENEGAL – IRRIGATION AND WATER QUALITY PROJECT	771
<i>Catherine Skokan</i>	
USING TIME-DOMAIN ELECTROMAGNETICS TO MAP THE TRANSITION OF AN AQUIFER TO AN AQUITARD	780
<i>David J. Hart, Curtis L. Thomas</i>	
CHARACTERIZATION OF A FRACTURED AQUIFER USING MULTICOMPONENT SEISMIC DATA	790
<i>Nedra D. Bonal, Clark R. Wilson</i>	
SEISMIC REFLECTION IMAGING OF SUSPECTED "WINDOWS" IN THE UPPER CONFINING UNIT OF THE MEMPHIS (TENNESSEE) AQUIFER	797
<i>Angela B. Pell, James B. Harris, Brian A. Waldron</i>	
USING CPT TO ESTIMATE AN AQUIFERS HETEROGENEITY	806
<i>Axel Tillmann, Zsuzsanna Nyari, Andreas Englert, Imre Fejes, Jan Vanderborght, Harry Vereecken</i>	
POSSIBLE EXTENT AND DEPTH OF SALT CONTAMINATION IN GROUND WATER USING GEOPHYSICAL TECHNIQUES, RED RIVER ALUMINUM SITE, STAMPS, ARKANSAS	815
<i>Gregory P. Stanton, Wade Kress</i>	

A COMPREHENSIVE GEOPHYSICAL CASE STUDY AT A FORMER RADIOACTIVE WASTE DISPOSAL SITE IN THE COLUMBIA RIVER VALLEY, SOUTHEASTERN WASHINGTON	821
<i>Danney R. Glaser II, Dale F. Rucker, James B. Fink, Mark T. Levitt, Christopher A. Baldyga</i>	
THE USE OF GEOPHYSICS TO MAP LOW LEVEL RADIOACTIVE WASTE DISPOSAL SITES AT FORMER AIR FORCE WEAPONS STORAGE AREAS	831
<i>Richard P. Allen, Ronald A. Crowson</i>	
COMPUTER SIMULATION OF HYDROCARBON FLOW AND WAVE FIELD FOR INTERPRETATION GPR MEASUREMENTS IN CONTAMINATED SITES	837
<i>Henryk Marcak, Tomislaw Golebiowski</i>	
HIGH RESOLUTION GROUND PENETRATING RADAR INVESTIGATIONS IN THE ARCHEOLOGICAL SITE OF CAVALLINO (LECCE, ITALY)	847
<i>Giovanni Leucci, Sergio Negri</i>	
3D IMAGING ARCHAEOLOGICAL TOMB BY VERTICAL ELECTRIC SOUNDINGS	856
<i>Keisuke Ushijima, Hideki Mizunaga, Toshiaki Tanaka, Kazuo Miyamoto</i>	
CAVITY DETECTION BY DC RESISTIVITY IMAGING IN KHALIFA CITY B, EMIRATE OF ABU DHABI, UAE	862
<i>Baoshu Li, Ali Taleb, Hassan Al Jafri</i>	
LESSONS FROM NORTHERN ALABAMA: MULTI-TECHNIQUE GEOPHYSICAL INVESTIGATION CHARACTERIZING THE BEDROCK AND FRACTURE NETWORK	874
<i>John M. Bartos Jr., Robert K. Davis, Bradley J. Carr, Colin Mellor</i>	
FACILITATING THE INCORPORATION OF GEOPHYSICS INTO GEOTECHNICAL PRACTICE	879
<i>F. Alex Rutledge, Matthew Mauldon, C.J. Smith</i>	
SLOPE STABILITY ANALYSIS OF THE ILIAMNA VOLCANO, ALASKA, USING ASTER TIR, SRTM DEM, AND AEROMAGNETIC DATA	883
<i>Mason A. Kass</i>	
SONIC LOG TO ESTIMATE ENGINEERING CHARACTERISTICS OF DEEP MIXED COLUMNS	892
<i>Ali Porbaha, Farid Ghaheri, Anand J. Puppala</i>	
EVALUATION OF LINEARITY OF FIRST MODE OF VIBRATION IN RESONANT COLUMN TESTING	902
<i>Zahid H. Khan, Giovanni Cascante, Hesham El Naggar</i>	
A SIMPLE AND EFFECTIVE CDI ANALYSIS SOFTWARE	916
<i>Garret A. Veloski, Ronald J. Lynn</i>	
QUALITY CONTROL/ QUALITY ASSURANCE SOFTWARE FOR DIGITAL GEOPHYSICAL MAPPING	922
<i>Amy N. Walker, Lorraine Godwin</i>	
LANDMINE AND UXO DISCRIMINATION USING BEAM FORMING TOMOGRAPHY	932
<i>David Tillson, Beiyuan Liang</i>	
 <u>SEISMIC REFLECTION APPLICATIONS</u>	
TIME-LAPSE HIGH RESOLUTION SEISMIC IMAGING OF A CATASTROPHIC SALT DISSOLUTION SINKHOLE IN CENTRAL KANSAS	943
<i>Jamie L. Lambrecht, Richard D. Miller, Steve Durrant</i>	
OBSERVATION OF SHEAR-WAVE SPLITTING IN QUATERNARY SEDIMENTS OF THE NEW MADRID SEISMIC ZONE: AN INDICATOR OF IN-SITU STRESS CONDITIONS?	952
<i>James B. Harris</i>	
NEAR-SURFACE CAVITY DETECTION BY HIGH-RESOLUTION SEISMIC REFLECTION METHODS USING SHORT-SPACING TYPE LAND STREAMER	959
<i>Tomio Inazaki, Shigeki Kawamura, Oshie Tazawa, Yoshihiro Yamanaka, Naomi Kano</i>	
A LAND STREAMER AIDED, THREE-DIMENSIONAL (3-D) SEISMIC REFLECTION SURVEY, BELT, MONTANA	971
<i>Trevor M. Dolena, Marvin A. Speece, Curtis A. Link, Patrick F. Miller, Terence E. Duaine</i>	
HIGH-RESOLUTION SEISMIC REFLECTION SURVEY USING LAND STREAMER IN A LARGE URBAN AREA	979
<i>Tomio Inazaki</i>	

SEISMIC REFRACTION APPLICATIONS

DETECTING CAVITIES WITH SEISMIC REFRACTION TOMOGRAPHY: CAN IT BE DONE?	989
<i>Jacob R. Sheehan, William E. Doll, David B. Watson, Wayne Mandel</i>	
IMPROVED PARALLEL SEISMIC TECHNIQUE FOR FOUNDATION ASSESSMENT	1004
<i>Ernst Niederleithinger, Alexander Taffe, Thomas Fechner</i>	
SEISMIC REFRACTION INTERPRETATION USING FINITE DIFFERENCE METHOD	1012
<i>Sherif M. Hanafy</i>	

SEISMIC SURFACE WAVES I

ESTIMATING VIBRATION RESPONSE OF EAST CANYON DAM, UTAH, FROM P-, S-, AND SURFACE-WAVE MEASUREMENTS	1025
<i>Richard D. Miller, Julian Ivanov, Richard D. Markiewicz, Daniel O'Connell</i>	
DIFFERENTIAL SURFACE WAVE DETECTION OF CHANGES IN FLUID SATURATION IN SOILS	1033
<i>L. T. Long, Tatiana Toteva</i>	
BURIED CHANNEL DELINEATION USING A PASSIVE SURFACE-WAVE METHOD IN URBAN AREA	1043
<i>Koichi Hayashi, Tomio Inazaki, Haruhiko Suzuki</i>	
MASW AND GPR SURVEY TO DELINEATE DEPTH-TOBEDROCK AND CRYSTAL CAVITIES FOR MINERAL EXPLORATION, HIDDENITE, NORTH CAROLINA	1051
<i>Mario Carnevale, Jutta Hager, Jonathan W. Brinkmann, Brian R. Jones</i>	

SEISMIC SURFACE WAVES II

TOWARDS THE STANDARDIZATION OF MULTI-STATION SURFACE WAVE METHOD FOR SITE INVESTIGATION	1061
<i>Chih-Ping Lin, Tzong-Sheng Chang, Chun-Hung Lin</i>	
USE OF NUMERICAL SIMULATIONS TO EXPLAIN SASW FIELD MEASUREMENTS	1075
<i>A. Nasser-Moghaddam, G. Cascante, C. Phillips, J. Hutchinson</i>	
DISCUSSION ON SOME PRACTICAL EQUATIONS WITH IMPLICATIONS TO HIGH-FREQUENCY SURFACE-WAVE TECHNIQUES	1089
<i>Jianghai Xia, Yixian Xu</i>	

SUBSURFACE CHARACTERIZATION

IDENTIFYING SHALLOW EXPANSIVE CLAYS PRIOR TO SITE DEVELOPMENT USING CAPACITIVELY COUPLED RESISTIVITY	1105
<i>K. Michael Garman, Scott F. Purcell</i>	
RESOLVING FINE - SCALE HYDROLOGICAL FEATURES IN ELECTRICAL RESISTIVITY TOMOGRAPHY IMAGES	1110
<i>Douglas LaBrecque, Roger Sharpe, James Brainard, Mehdi Eliassi, David Alumbaugh</i>	
EXPLORING DIRECTIONAL DIFFERENCES IN RESISTIVITY RESULTS IN KARST	1117
<i>Ronald Manney, Mary J.S. Roth, Jonathan E. Nyquist</i>	
THE EFFECT OF CHANGING THE SALINITY OF THE GROUNDWATER ON SIP OF SANDSTONES	1125
<i>Andreas Weller, Julian B. T. Scott, Norbert Schleifer, Ron D. Barker</i>	
INTEGRATED GEOPHYSICAL CHARACTERIZATION AT A CONTAMINATED SITE	1129
<i>Mario Carnevale, Jutta Hager, Brian R. Jones</i>	

UXO MODELING/PROCESSING I

AIRBORNE MAGNETOMETER DATA REDUCTION AND EVALUATION AT THE FORMER EOD AREA (NAAD 01) CAMP NAVAJO, NORTHERN ARIZONA	1142
<i>Raye M. Lahti, Joseph W. Dauchy, Joe B. Davis, William Myer, Randall Wilkinson</i>	
HIGHLY CONTAMINATED UXO SITES: COMBINATION OF GPR AND EMI FOR DISCRIMINATION OF CLUSTERED SCATTERERS	1156
<i>Keli Sun, Kevin O'Neill, Chi-Chih Chen, Hyoung-Sun Youn, Fridon Shubitidze, Irma Shamatava, Keith D Paulsen</i>	

BROADBAND ELECTROMAGNETIC DETECTION AND DISCRIMINATION OF UNDERWATER UXO	1166
---	------

Bill San Filippo, Steve Norton, I.J. Won

DETECTION OF UXO AND LANDMINES USING 2-D MODELING OF GEOELECTRICAL RESISTIVITY DATA	1176
--	------

Gad El-Qady, Keisuke Ushijima

UXO MODELING/PROCESSING II

AUTOMATIC DETECTION OF UXO ANOMALIES USING EXTENDED EULER DECONVOLUTION	1183
--	------

Kris Davis, Yaoguo Li, Misac Nabighian

PROCESSING AND INVERSION OF MAGNETIC GRADIENT TENSOR DATA FOR UXO APPLICATIONS	1193
---	------

Vinicio Sanchez, David Sinex, Yaoguo Li, Misac Nabighian, David Wright, David Von Smith

SOIL-METAL DISCRIMINATION ANALYSIS OF EM 61 MK II TIME DECAY RESPONSE AT FORMER CAMP CROFT, SC	1203
---	------

David A. Smith, G. Hunter Ware, Roger J. Young, Alison J. Paski, David S. Wolf, Derek R. Anderson, William F. Tompkins

APPLICATION AND EXTENSION OF TEXTURE FEATURE CODING METHODS TO ANTI-TANK LANDMINE DETECTION	1211
--	------

Peter Torrone, Leslie Collins

UXO MULTI-SENSOR SYSTEMS

MULTISENSOR, REMOTELY-OPERATED FORCE PROTECTION MINE DETECTION	1222
---	------

Gregory M. Schultz, Karen Norris Zachery, Leslie M. Collins

A MULTISENSOR SYSTEM FOR THE DETECTION AND CHARACTERIZATION OF UXO	1236
---	------

Alex Becker, Erika Gasperikova, H. Frank Morrison, J. Torquil Smith

THE ADVANCED ORDNANCE LOCATOR (AOL): A DUAL-MODE TEM AND MAGNETICS SYSTEM FOR DETECTION AND CLASSIFICATION OF UXO	1244
--	------

D.D. Snyder, D.C. George

MULTI-SENSOR UXO DETECTION SYSTEM	1254
--	------

Noel T. Rogers, Stewart K. Sandberg, H. H. Bennett Jr.

DIGITAL GEOPHYSICAL MAPPING IN WOODED CONDITIONS USING AN INTEGRATED EM61 MKII AND ROBOTIC TOTAL STATION NAVIGATION VEHICULAR-TOWED DEPLOYMENT SYSTEM	1261
--	------

Martin J. Miele, Ji Ma, Sandra A. Takata, John P. Dolynchuk, Mark Sellers, Larry Fowler

UXO NUMERICAL METHODS

A SIMPLE MAGNETIC CHARGE MODEL FOR CLASSIFICATION OF MULTIPLE BURIED METALLIC OBJECTS IN CASES WITH OVERLAPPING SIGNALS	1270
--	------

Fridon Shubitidze, Kevin O'Neill, Irma Shamatava, Keli Sun, Keith Paulsen

AN EMPIRICALLY BASED ELLIPSOIDAL MODEL FOR MULTIPLE FREQUENCY EMI SIGNATURES FROM UXO	1280
--	------

Bruce Barrow, Nagi Khadr, Jonathan Miller, Herbert H. Nelson

DECAY TIME CONSTANT ANALYSIS FOR UXO TARGET PRIORITIZATION	1291
---	------

Bart G. Hoekstra, Amy Walker, Andrew Schwartz

SUPPORT VECTOR MACHINES FOR EM DATA INTERPRETATION	1299
---	------

Heidi Anderson Kuzma, James W. Rector

UXO DISCRIMINATION USING BLIND SOURCE SEPARATION	1306
---	------

Yingyi Tan, Stacy L. Tantum, Leslie M. Collins

UXO QA/QC

MEETING TIGHTER NAVIGATION AND DATA QC REQUIREMENTS FOR MEC INVESTIGATIONS	1318
---	------

Kent Boler, Martin Miele, Ji Ma, Richard Grabowski

THE EFFECTS OF SPEED AND PLATFORM STABILITY ON EM61 MK2 ANOMALY RESPONSES	1326
<i>Andrew B. Schwartz, Amy N. Walker</i>	
EVOLVING GEOPHYSICAL STANDARDS 2004	1340
<i>Rick A. Hoover</i>	

UXO SINGLE SENSOR SYSTEMS

A GROUND-BASED SQUID MAGNETOMETER	1347
<i>W.E. Doll, T.J. Gamey, L.P. Beard, J.R. Sheehan, Wayne Mandell</i>	
ALLTEM, A TRIANGLE WAVE ON-TIME TIME-DOMAIN SYSTEM FOR UXO APPLICATIONS	1357
<i>David L. Wright, Craig W. Moulton, Theodore H. Asch, S. Raymond Hutton, Philip J. Brown, Misac N. Nabighian, Yaoguo Li</i>	
NOISE IN TIME DOMAIN EM SYSTEMS	1368
<i>D.C. George, D.D. Snyder</i>	
COAXIAL ELECTROMAGNETIC SENSOR FOR UXO DETECTION	1378
<i>Haoping Huang, Bill San Filippo, Alex Oren, I. J. Won</i>	

Author Index